SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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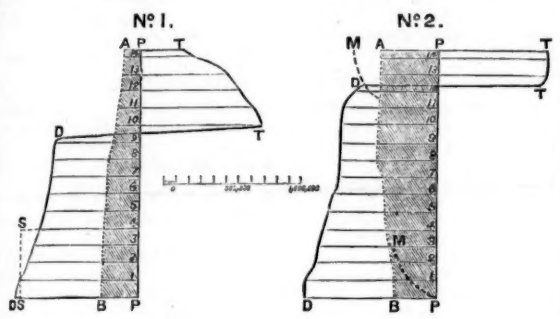
Original Correspondence.

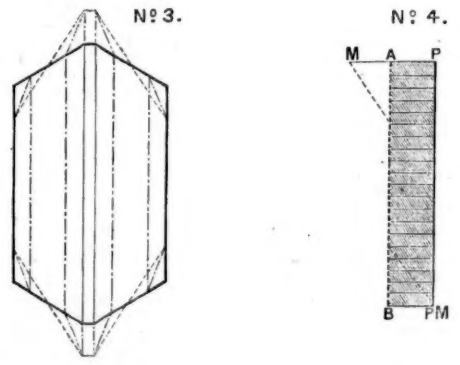
WINDING ENGINES—ON THE SCROLL DRUM.*

In a late discussion on Mr. Daglish's paper, "On the Counterbalancing of Winding-Engines," reference was made to a series of experiments conducted by the writer upon the actual expenditure of power in large winding-engines. These experiments formed the subject of a paper published in the "Transactions of the Institution of Mechanical Engineers."

It was shown by these experiments that the uniformity of load to be obtained by a system of counterbalancing or by the scroll-drum was merely one element in the question of winding economy, and that the mass of machinery in motion introduced dynamical considerations of even greater importance. That, in fact, it was as necessary to compensate for dynamical forces as for statical ones. Since the date of those experiments considerable alterations have been made in the working loads upon the scroll-drum there referred to, and it may probably be interesting to compare the results of the old experiments with a set obtained under the altered circumstances.

The Kiveton Park engines are a pair of 36-in. high-pressure engines, having a 6-ft. stroke, and driving a drum varying from 20 ft. to 30 ft. in diameter. At the time of the former experiments a single-decked cage, holding two tubs, carrying 22 cwts. of coal, was used. Now a double-decked cage, holding four tubs, containing 44 cwts., is in use.





Diagrams 1 and 2 show the result of the two sets of experiments. The lines A P, measured off by ordinates from the vertical P P, shows the net load upon the engine for one journey, the included area, A B, P P representing the total useful work done. The line D D, T T gives the actual positive or negative power expended in the cylinders over the same interval, this line being calculated from several series of diagrams taken with the Richards indicator. The mass of matter in motion may be taken as follows:—

	No. 1 Experiment.	No. 2 Experiment.
Drum	Tons 45	Tons 45
Ropes	4½	4½
Cages, tubs, and coal	4	8
Pullies	6½	6½
Total	60	64

This is exclusive of main shafts, cranks, boss of drum, &c., and the whole mass may without material error be considered to travel at the same speed as the load.

It will be observed that in No. 1 series the engine is run with full steam for nine revolutions, and that it is then reversed, and is converted into an air-pump for the remaining five revolutions.

It is thus usefully occupied 65 per cent. of each journey. In the No. 2 series the engine is run with full steam for 12 revolutions, and is reversed for the remaining 2¼th revolutions. It is thus usefully occupied 85 per cent. of each journey.

It will thus be observed that a better ratio of useful effect is obtained with the greater loading. The time occupied in running is 45 seconds in both cases. With regard to the load line it will be observed that the increase in the loading has entirely changed its character. In the No. 1 series the load for each revolution of the engine commences at 286,026, and diminishes to 114,936, whilst in the No. 2 series it commences at 330,255, and increases to 467,165 ft.-lbs.

Thus, therefore, in one case the engine is under and in the other overbalanced, with, as it may be seen, a most material improvement in the working of the engine. In the latter case, nothing can speak more strongly to this effect than the diagrams themselves.

Twelve revolutions of the engine under steam serve to raise twice the load which 9 revolutions formerly effected; that is, twice the work is done with ⅓rd more use of the steam cylinder. Thus, therefore, there is evidence of a very decided improvement in the working of the engine. It appears on the diagram; it is shown by the statement just given; and it is shown by the simple fact that the engine has just doubled its useful effect.

Whilst, therefore, the Kiveton Park scrole drum must now be considered a very successful application of the principle, it still shows clearly that farther and most material improvements may be made by a reduction of the weights of machinery in motion, and by a modification of load line to neutralize the effect of that amount of weight which is unavoidably necessary.

At the Kiveton Colliery the mean velocity of the cages is 31·5 ft. per second, the maximum velocity being probably 45 ft. per second. To get the 64 tons of matter up to this speed an amount of power is absorbed equal to 4,530,176 ft.-lbs., and this is represented graphically by the line S S, diagram 1.

In other words, were the cages unloaded, five revolutions of the engine under full steam would be required to get up the speed of the machinery. This power is finally re-absorbed by the counterpressure work or by the break, and the capacity of the engine to produce useful work is thus diminished by both these amounts. This is also clearly shown by both diagrams 1 and 2, in which the steam-power exerted is three times greater than the useful work done. The first step, therefore, is to cut down the weights. Massive cast-iron spokes and drum rings must give way to wrought-iron spokes and wrought-iron rope grooves. There is no reason why a well-designed drum should not be built on this principle of 30 ft. in diameter, at from 15 to 20 tons.

The other modification required is in the form of the load line. This ought to take the direction shown by the line M M, the object being to so lighten the load at the commencement of the run that the power of the engine is expended for the most part in getting up the momentum of the machinery, whilst at the termination of the run this momentum comes into action in assisting the engine in completing the journey.

For two or three reasons, which it is not necessary here to detail, it is maintained that for the depth of 400 yards, 14 full revolutions of the engine are too few for the development of the best results. Increasing the number of revolutions to 20, and estimating for the following working loads: cage and tubs, 50 cwts.; coal, 50 cwts.; rope, 30 cwts.; it will be found that a drum varying in the proportion of 7 to 5 will give the straight load line shown in diagram 3. This would be a drum varying from 15·91 to 22·28 ft. in diameter.

To estimate the momentum of the machinery the following weights are assigned to the moving parts: drums, 15 tons; ropes and cages, 8 tons; pulleys, 7 tons; coal and tubs, 5 tons: equal to 35 tons. The time occupied in the shaft journey at Kiveton is 45 seconds. With a lighter drum and modified pitch there is no reason why the time should not be reduced to 40 seconds. Assuming that five revolutions of the engine are accelerating and five diminishing in speed, the maximum speed of runningwould be 1200 ÷ 30 40 ft. per second.

To ascertain the power absorbed in getting 35 tons up to this velocity the following formula is available—$P = (v_2 \div 2q)\ M$.

Where P = work done in ft.-lbs.
„ M = weight of machinery in pounds.
„ $(v^2 \div 2q) = b$ = height a body would fall freely in space to acquire velocity.

Substituting figures we have:—P = (1600 ÷ 64) × 78490 = 25 × 78400 = 1960000.

The question, therefore, for consideration is how to expend this 1,960,000 ft.-lbs. of potential energy usefully upon the shaft load. The simplest method of attaining this end is so to modify the rise of the drum that the ascending cage shall increase and the descending cage diminish its velocity to an amount sufficient to absorb this power or a considerable portion of it. To preserve a proper proportion this increase and decrease of rise should be uniform at both extremes of the drum, and it may be thus ascertained. The weights affected by an alteration of diameter are the cages, coal, and tubs, and so much of each rope as is in the shaft. This amounts to 180 cwts., or 20,160 lbs. It is immaterial for purposes of calculation whether a greater amount of travel is given to the ascending load, a less amount to the descending load, or whether it is distributed between them, the action on the matter in motion being the same in any case.

If, therefore, we divide the potential energy of 1,960,000 ft.-lbs. located in the matter in motion by 20,160, the ascending and descending weights, we obtain a resultant 1,960,000 ÷ 20,160 = 97 = number of feet the travel of ascending cage must be increased, and of descending cage diminished, to use up or absorb this energy. If this be effected in the five initial and terminal revolutions, we have 97 ÷ 5 = 19·40 feet per revolution = 19·40 ÷ 3·1416 = 6 feet increase or decrease in diameter of drum. There are, however, one or two practical considerations to be had in view in the introduction of this modification. Thus the difference in diameter must at no point be so great that the engine cannot be moved from a state of rest.

In the Kiveton engines the steam-power is at any point treble the statical load. Taking it in the assumed case at twice the statical load, we have the following. With drum of uniform statical load, the net load on engine in every position of cages is—

Loaded cage at bottom. { Cage, tubs, coal, rope. } 130 × (15·91 ÷ 2) × 112 = 115824·8 lbs.
Empty cage at top. { Cage, and tubs. } 50 × (22·28 ÷ 2) × 112 = 62384· „
53440·8 „

Or, 53440·8 lbs. load, as measured 1 ft. from centre of drum-shaft.

It is required to ascertain the terminal diameters which will double this load or increase it to 53440·8 × 2 = 106881·6 lbs. The increase and decrease of diameter being the same, it is necessary only to find the value of this:—Let x = this value, a = large diameter of scroll of equal loading, b = smaller diameter of scroll of equal loading. Then, when the loaded cages are at pit-top, which will be the most unfavourable statical loading on engine:—5600 $(a + x)$ − 4480 $(b - x)$ = 106811·6, and x = 53394 ÷ 10080 = 5·29 ft., and the drum must vary from 22·28 + 5·29 = 27·57 ft. to 15·91 − 5·29 = 10·62 ft. in diameter.

This range in diameter is rather less than would be adequate to expend usefully all the power absorbed in the mass of the machinery, but it would do so to a very great extent.

It is probable that in practice instead of giving a variable slope to the drum one uniform rise would be better, as shown by dotted line in diag. 3. It would unquestionably admit of simpler construction. There is no reason why, with a drum of this design, a pair of 30-in. cylinders, working at the same boiler pressure, and with the same depth of shaft, should not raise a greater weight of coal than the 36-in. cylinders are now raising at Kiveton, and that with less wear and tear, and very much less steam consumption. This, of course, means a cheaper engine in first cost, and a cheaper engine in working cost, and that to a degree by no means inappreciable.

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* We have been favoured by Mr. Fowler with a copy of his paper which is to be read at the meeting of the Northern Institute of Mining and Mechanical Engineers to be held at Newcastle-on-Tyne this day.

EXPERIMENTS WITH LITHOFRACTEUR.

We last week alluded in general terms to a series of important experiments which were carried out with Lithofracteur, on Feb. 20, before the War Office Committee on Explosives, of which Col. Younghusband, R.E., is president. Want of space then obliged us to hold over the details of these experiments until our present issue, but we now place them before our readers. It may be remembered that in May last a somewhat similar series of experiments were carried out by Messrs. Krebs and Co., of Cologne, who are the manufacturers of Lithofracteur, the object being to demonstrate the safety of the substance in storage and transport, as well as its fitness for use as a blasting agent in mining and quarrying operations. The results of those trials were communicated to the Secretary of State for the Home Department, who placed the matter in the hands of the Committee on Explosives for investigation. After examining a few witnesses as to its safety in manufacture and use, the committee desired to see the previous experiments repeated, with some additions which they suggested. This was readily assented to by the Messrs. Krebs, and as Mr. France's limestone quarries at Nant Mawr, near Shrewsbury, where the previous experiments were made, presented unusual facilities for carrying out the programme, that gentleman's offer to lend them again for the purpose was at once accepted. The main point to which the attention of the committee was directed was the safety of Lithofracteur under every contingency of transport, storage, and use. Its power they considered well established, so that, except in a few military operations, that point was not made very prominent. Besides the members of the War Office Committee there were present at these experiments the representatives of the French, American, and Peruvian Governments, the managers of some of our leading railways, a large number of mining engineers and managers, besides many civil engineers and other scientific gentlemen. The experiments were carried out by Prof. Engels (a partner in the firm of Krebs and Co.), Mr. O. Kirkmann (the representative of the firm), and Mr. Perry F. Nursey (their engineer in England), Mr. France also lending valuable assistance throughout the proceedings.

The manufacture of Lithofracteur is a secret process, and any attempt to determine its ingredients can only be guesswork. Various analyses of the compound have been given, no two agreeing except upon a few general points, the chief of which is that it contains nitroglycerine as a base. It is of a dark-slate colour, has a pasty consistency, and is only exploded by means of percussive fire. It is made up into cartridges weighing from ½ oz. to 2 ozs., the cartridges being packed in cardboard boxes of 5 lbs. each, ten of these boxes being packed in a deal box, and constituting a case. The attention of the committee was first given to the action of Lithofracteur under the conditions of great heat. Its safety in this respect was first shown by Herr Engels placing a small piece of the compound in a cup, floated in an oil bath, under which was a spirit lamp. A thermometer dipped into the cup containing the Lithofracteur, and when 190° centigrade (or 374° Fahr.) were registered the compound smouldered away without bursting into flame, much less exploding, as had been anticipated by some who were not familiar with the substance. A few shots were then fired by electricity in the hard limestone rock of the quarry, with effects which were, perhaps, best appreciated by the numerous mining managers who were present, and who were more than once heard to wish they "a little bit o' the stuff." The next point was to ascertain the probable consequences that would result from a magazine or store of Lithofracteur being surrounded by fire, and becoming ignited from without, and also from a fire happening within the store. To demonstrate the first point, a 5-lb. box of Lithofracteur was placed in the centre of a heap of straw, brambles, and faggots of wood, and set on fire. On the flame reaching the Lithofracteur the contents of the box burned quietly away without any sign of explosion whatever. To prove the second point, the same weight of the compound was enclosed in a stout deal box, which was made as nearly air-tight as possible, and placed in a hollow in the rock. The opening was filled in with stone, and covered with an iron plate, in order to exclude the air as much as possible, and the charge was ignited by means of an ordinary Bickford mining fuse, without a cap, and which had been inserted in the cartridges before the box was nailed down. The result of the application of fire inwardly was precisely the same as when it was applied outwardly, the Lithofracteur only burning gently and slowly away. An examination of the deal box showed that the inside was only slightly charred, an evidence of the low temperature developed by Lithofracteur when ignited by fire without percussion. These experiments go far to establish the comparative harmlessness of the compound under the conditions to which we have referred.

Some minor experiments for safety under concussion were also made. Cartridges were pounded between hard wooden surfaces, between stone and iron, and between iron and iron. The result in each case was simply a spreading out of the pasty substance over the surfaces between which they were beaten. A deal box, containing 5 lbs. of Lithofracteur cartridges, was then thrown from the top of the quarry on to the plateau below, a vertical distance of 150 ft., the only effect being the smashing of the box, and the scattering of the cartridges about. The more practical experiments for demonstrating the safety and non-explosiveness of Lithofracteur, except under very extreme conditions, were made on the railway incline which runs from the face of Mr. France's workings down to the bottom of the valley below, where it joins the main line. It has a gradient of 1 in 8, and is 500 yards in length, being, therefore, admirably adapted for illustrating a veritable railway collision. These experiments were carried out in a similar manner to those made in May last, so that we need only here state them in general terms, referring our readers to the *Mining Journal* for May 20, 1871, for details. A mineral wagon weighing about 1¼ tons, with wooden buffers, was first fixed at the bottom of Mr. France's railway incline. On each of the front buffers were tied three

cartridges of Lithofracteur, whilst on those of a wagon at the top of the incline were tied two more. Two cartridges were tied on the rails about half way down the incline, and two were smeared on the rails 30 yards lower down. On the upper wagon being released it rushed down the incline at an estimated speed of 40 miles an hour, exploding one of the tied cartridges on its way, fairly hitting the buffers of the lower wagon, and scattering the cartridges in all directions, without exploding them. The experiment was then repeated with iron-faced buffers, and cartridges tied and smeared on the rails as before. The upper wagon, in its downward course, did not explode either of the cartridges on the rails, but, on contact with the lower wagon those on the buffers were exploded, as was expected, when contact was made between iron and iron. At the desire of the committee the experiment was repeated with one pair of wooden and one pair of iron-plated buffers. Upon the descending wagon reaching within a short distance of the lower one a wheel broke, and the wagon toppled over into the other, without a fair collision of the buffers. No explosion, however, occurred, and the Lithofracteur was found smeared about the wreck of the wagons and upon the ground. These experiments were watched with great interest by railway managers especially, and to all they afforded incontrovertible evidence of the safety of Lithofracteur, except in the extreme and very improbable case of the compound getting between two iron surfaces in a railway collision while the train was running at full speed.

The experiments to illustrate the application of Lithofracteur in military operations consisted in the demolition of bomb-proof magazines, stockades, and the formation of trenches for sheltering an attacking party. The effects of the explosive on the top of a bomb-proof magazine were shown by placing 15 lbs. of Lithofracteur on a structure consisting of nine lengths of 75-lbs. double-headed rails laid side by side, the head of each alternate rail being packed into its neighbour's web. The rails had a 6-ft. bearing, and their lengths ranged from 8 to 12 ft. The Lithofracteur was laid on the top, and tamped with a fresh-cut turf. The explosion broke three lengths of rail in halves, and bent the remaining six, one having a crack extending several feet along the web. One piece of rail, 2 ft. 7 in. long, was thrown to a distance of 24 ft. from the point where the structure had stood. Two stockades, a single and a double one, which had been erected on a commanding eminence, were then experimented upon. The single stockade was taken first; it was composed of 12 half-round timber sleepers, 9 ft. long by 10 in. wide by 6 in. thick at the centre, bedded 1 ft. 6 in. in the ground, and braced together near the top by timber planking. At the foot of the stockade, and in the front, was laid a 12-ft. length of india-rubber tubing, 2 in. in internal diameter, containing 27 lbs. of Lithofracteur. The charge was fired with a Bickford safety-fuse, primed with a detonating cap, which was inserted in the Lithofracteur. Upon ignition taking place, only a portion of the charged exploded, about one-third, owing to the remainder having become frozen from exposure to the cold on the hill tops, where these experiments were carried out since early morning. It was not thawed before use, as it might have been by placing it in a layer of horse-dung, the committee having previously expressed a wish to see some experiments carried out with frozen Lithofracteur. The portion of the charge which exploded cut off four of the sleepers close to the ground line, and threw them a long distance to the rear. The remaining portion of the charge was then re-fused and fired, when another 4-ft. length was partly exploded, the charge being scattered about. The explosion displaced two more sleepers, but did no further mischief. The charge was capped and fired for a third time, with two fuses, the result being only the explosion of a small portion of Lithofracteur, two reports, similar to pistol shots, being heard, and the ignition of the remainder, which burnt itself out, the flames only charring the face of the stockade.

Operations were then commenced against the double stockade, which was 225 ft. from the single one. The object in view was to blow the structure with damaging effect against the defenders, and at the same time to form a crater for the attacking party to intrench themselves in. The front portion of the double stockade was formed of 21 timbers, of similar dimensions to those in the single stockade, and arranged in the same manner, but with two extra timbers at the rear in the centre. The rear row consisted of 14 similar timbers, placed 7 ft. from the front row. At the foot of the front row were laid two 11-ft. lengths of 4¼-in. zinc tubing, each charged with 75 lbs. of Lithofracteur. The tubes were laid end to end, and the capped fuse was inserted at their junction, in the centre of the stockade. The result was a tremendous explosion, which blew the whole stockade in fragments to great distances, broke the windows and damaged the roof of a house about 400 yards away, and formed a crater 24 ft. by 9 ft. by 2 ft. 9 in. deep where the stockade had stood. The earth was loosened for a depth of 12 ft. or so beneath the bottom of the crater, and was in good condition for easy removal by the advancing party. The explosion was distinctly heard in Shrewsbury, 22 miles off, whilst in Oswestry, about four miles off, it was felt as well as heard. To effect a lodgment for an attacking party a 6-ft. length of 4¼-in. zinc tube, containing 43 lbs. of Lithofracteur, was buried vertically in the earth. The result of the explosion of the charge was a crater 16 ft. in diameter, and 4 ft. 6 in. deep, the soil being loosened to the limestone, about 12 ft. beneath.

The last experiment of the day had reference to torpedoes and sub-aqueous operations. At the foot of Mr. France's quarries runs a brook 7 ft. 6 in. wide, over which was thrown a bridge consisting of seven railway sleepers laid side by side, the underside of the sleepers being 1 in. below the level of the water, and the bottom of the brook being 2 ft. 3 in. below that point at the centre. The sleepers were similar to those used in the stockades. On this bridge were laid 18 more sleepers, arranged in three layers, parallel with the first, and packed with alternating layers of turf and clay. On the top was a heap of earth 3 ft. deep, and under the bridge were floated two boxes, each containing 50 lbs. of Lithofracteur, separately capped and fused. The report of the explosion was, of course, exceedingly violent, and the bridge and its load were utterly demolished, earth and splinters being thrown to a great height into the air, the debris covering a large area of ground. A basin was formed in the banks and bottom of the brook 21 ft. in diameter and 6 ft. deep from the water-line at the centre. The results of this experiment, besides showing the enormous power of Lithofracteur, proved its efficiency under water, for the boxes were of thin deal, and were not in any way made water-tight.

It was, however, questioned by some present whether one fuse might not have burnt more rapidly than the other, so that one box only was exploded, the other being blown away. Another gentleman suggested that if the boxes had not been in immediate contact with the bridge the explosion would have been less effective. In order, therefore, to answer both these points, as well as to illustrate the effects of blasting with Lithofracteur in a very hard rock, some further experiments were arranged for the next day at Mr. France's greenstone quarries, in the Breidden mountain range, about six miles from Nant Mawr. A number of highly successful blasts were first made in the extremely tough greenstone rock, to the satisfaction of several mining engineers who were present. After this a raft was formed of two sleepers fixed 6 in. apart, and under each sleeper was a 5-lb. box of Lithofracteur. The distance between the boxes was 12 in., and they were suspended 4 in. below the sleepers, thus interposing a cushion of water between the explosive and the object to be acted upon.

Only one box was fused, but upon the raft being floated out into the Severn and fired two distinct eruptions of water were at first visible, showing that both boxes had simultaneously exploded. The sleepers, upon each of which a large lump of rock had been fixed, were hurled high into the air in the form of matchwood, testifying that although a cushion of water had been interposed it did not retard the effects of the explosive upon the structure. Of course, the experimenters predicted both these results, but they were desirous in every way to meet any possible objection that could be raised. The whole affair went off most satisfactorily, the creature comforts of the numerous guests being well attended to by Mr. O. Kirkmann, and special trains being placed at their disposal each day by Mr. Elias, the manager of the local lines of railway.

MOTIVE-POWER FOR TRAMWAY CARS.—The invention of Mr. F. J. ROWAN, C.E., of Victoria Chambers, Westminster, consists of the application of an under-carriage or bogey, with wheels of different sizes under one end of a tramway car, in such a manner as to form, at one and the same time, a support for the car and a bed or base for a steam, air, electro-magnetic, or other engine, which may be used for the purpose of propelling the said car, while the said bogey carries also a cylinder, or part of a cylinder, of wrought-iron or other suitable material, so arranged as to cover and conceal the engine, and to have the appearance externally of being a portion of the car itself.

GIRDWOOD'S PATENT RECIPROCATING CRUSHER.

TO THE EDITOR OF THE MINING JOURNAL.

SIR,—This crusher has a reciprocating as well as a rotating motion, which answers the double purpose of both grinding and crushing, and thereby increases the amount of work done by simply a crushing action more than 50 per cent., with the same power applied. The reciprocating action also has the effect of preventing the surfaces of the rolls from grooving and pitting, or wearing unevenly—matters of vital importance in fine crushing, and which are the main objects of the invention. It can also be regulated to crush finer or rougher, as the nature of the stuff requires; this also is of the utmost importance in fine crushing, and which, though important as it has been felt to be by all practical men, is not provided for by any crusher hitherto in use. Some ores, particularly lead, by a stamping or purely grinding process the metallic portions are reduced so fine as to render it extremely difficult to prevent a large portion from flowing off with the water used in its treatment. The complete control in regulating this crusher, so as to reduce the skimpings to the required degree of fineness, renders it an indispensable implement on all mineral dressing-floors, as that which is now waste will, by its assistance, pay the entire surface cost on the ores. GEORGE GREENE.

Aberystwith, Feb. 22.

PRACTICAL MINING—THE PULVERISER.

SIR,—I am very pleased to learn that the Committee of the Royal Cornwall Polytechnic Society have unanimously awarded the special premium of 20*l.* (offered conjointly by yourself and that society "to the inventor of the best and a distinct machine for improvements in the dressing of mineral ores") to Mr. Francis Dingey, of Truro, for his Patent Pulveriser.

The surface improvements at Bronfloyd are now nearly completed, and the Dingey machine is daily at work. The small raft-wheel to supply this pulveriser will be finished by Saturday, and as this will deliver the Bronfloyd waste from the jiggers into the hopper of the machine, after its flow through 12-in. glazed pipes, it will, by reason of the regularity and economy of the self-feed, make its work still more satisfactory; but it is due that I should add that at present I believe the machine will return in lead ore enough to pay for its cost in a very short space of time.

The Wire Tramway is now delivering our ore from the floors to the Cwm-bwa ore bin (950 yards) with the greatest ease and simplicity, and from present experience it is thought that it will so deliver 5 tons of dressed lead ore per hour.

Trusting to your usual liberality of space, I take this opportunity to state that the days of working the wire-tramway will be Wednesday and Saturday of each week after dinner-hour (12 o'clock); and I do so because as the Dingey machine and the tramway are worked by the same water-wheel, and at present it is not practicable to work both machines at the same time, it is desirable not to stop the Dingey any oftener than needful. The rush of friends, and the natural wish of the mining interest to see these new appliances in practical and effective use, causes some inconvenience by the necessity for the continual stoppage of one machine to set the other in motion, entailing a great loss of labour and of time. After this week such must, however reluctantly, be abandoned; but, as I shall be happy on application to give orders to view for and upon the days named, the object of this regulation will, I trust, be appreciated.

Bryn-y-mor, Aberystwith, Feb. 28. J. B. BALCOMBE.

SOLSTAD COPPER MINE, SWEDEN.

SIR,—In the *Mining Journal* of Feb. 25, 1871, was a letter from Capt. John Sprague, describing this mine, the dislocation or slides filled with clay, and the greenstone dykes met, adducing, as a rare instance of these in Sweden, another old mine 100 miles north of his, and which I assume to be Arvidsberg. I had nearly finished a letter for Capt. Sprague, when I learnt he had left the mine. The instance given him by the old miner was in no way similar, or of any use for guidance in his case. The Arvidsberg dislocation was about 50 fms.—not 100 fms.—from the surface. The clay is talc, the records say 2 ft. thick. I have not seen it more than 6 in. with accompanying chlorite. The inclination—about 30° from the vertical, dipping E. The ore was got under the clay, but lost as usual by trap (diabase) intervening. The dislocation or slide, not the trap, altered the position of the ore some 3 fms. eastward, and was found by driving cross-levels in the diabase. The old miners abandoned the mine 30 ft. under those cross-levels. These dislocations are not uncommon in Sweden. They can be seen on the coast here intersecting the gneiss, &c. In Arvidsberg some of the felspathic-granite is shattered into small angular gravel—some places show slickensides. These slides are much dreaded in Sweden. By the common underhand stoping they endanger the safety of the whole mine, and instances are well-known of sides falling in. They always require much care to get under. Then, they are always feeders of water, and where absent the Swedish mines are found very dry, so much so that in summer, at Stenbo Iron Mines, water has been sent down for boring. The nipping out of ores by trap is quite the rule in Sweden. Ore is found in bead-veins, in "kortlar"—literally glandular masses—lens, wedge, elipsoid, up to the entirely irregular stock or isolated masses. Cases of these various sorts are well known. At Bergsbo, the great mine that nearly supplies Atridaberg, the ore has been cut off several times by greenstone, and once requiring a year's labour in sinking and levels ere recovered.

My chief object, now, is to draw your readers' attention to a short description of Solstad Mine in the last part of "The Sern-Kontorets Annaler" for last year, just published. In the last pages Mr. O. T. Witt, a young Swedish bergsman, already of some note, reports his employment there in surveying and making geognostic plans of the mine. I subjoin an abstract of his remarks on it, which, taken in connection with Mr. Sprague's and other letters, may interest your readers.

According to old records, the mine was 5 fms. deep in 1740, since then it has been sunk to 90 fms.; there a great mass of trap was met with, which pushed away nearly all the ore, and itself filled up a great part of the mine bottom. After sinking through the trap and underlying quartz to a vertical depth of 5 fm. without meeting the desired change, here the augmented depth made the water and winding difficult for the horse-whim, so in 1784 all work was stopped in the bottom. But higher up in the mine they sought the parallel veins, and took out ore left in the walls. All mining ceased in the beginning of this century. In 1863 this, with some neighbouring small mines, was bought by the Swedish Copper Company, and pumped dry in 4864. In working the mine from 470 to 600 feet from the surface, three trap intersections were gone through one after the other. Then much fine ore was met with, which reached to 800 feet deep, where again a similar trap was met with. Herr Witt illustrates his report by longitudinal and cross-sections, which can be seen in above part at a small cost. The direction of the lode is N.W. to S.E., and dips to the S.W. at about 20° to 30° from vertical. These intersections on two places are accompanied and penetrated by some thin talc flookan. The quartz is partly dark and partly light coloured, and always mixed more or less with dark mica scales. According to the old records the dark quartz carried the ore. The granite, which is in general red, is close to the trap, altered to protogine, and goes over through pegneatite to fine quartz. Gneiss has been found only in two places under the trap; its constituent parts are red felspar and some black mica.

The trap veins are in general one foot thick, and lined on both sides with more or less thick talc flookan. In the first of the above intersections three trap veins, and in the second, now found in the bottom of the mine, only one has been gone through. This has under it beautiful dark quartz, whence it is hoped that again the ore may soon be met with. Four trap veins are shown on the surface, and it is possible that they may be the same as are met with in the mine. The third trap vein wedges itself out in the north end of the mine, and, according to calculation, will do the same throughout the whole of its length.

Three talc dislocations have been met with, one of which goes nearly in the north-eastern wall, under it; the second closely follows the south-west or hanging wall, according to the old records; behind these no ore was to be found; but this likewise has been gone through, and ore found behind. After the rich ore had been got throughout the south-west side of the whole mine, the poorer sort got here, with 3 to 4 per cent. of copper, was acceptable. When this ore was taken out behind it was found the third talc flookan, which for the present is regarded as the boundary of the ore in the hanging wall. By a consideration of the cross-section it appears singular why no ore accompanies the granite under the intersection on the north-eastern side. This can possibly happen from an unknown parallel, therefore cross-levels are also recommended to be driven to the N.E. and S.W., at the respective distances of 300 and 700 feet from the surface. Mining is carried on in the deepest bottom to seek for the ore, also in several places between 300 and 500 feet from the surface, to take out the remaining poorer ore of 3 per cent. which is extracted by the wet method.

The remainder of the report is concerned with the working of the mine, payment of men, ventilation, pumps, and winding. These are irrelevant to the matter first brought before your readers by these intersections of the ore by trap. I was told at the Mining School in Stockholm, two weeks ago, that a telegram had reached Stockholm saying the ore had again been found. J. C.

Feb. 19.

GREAT DEPOSIT OF RICH IRON ORE.

SIR,—At a place called Trwyntal, on the foreshore, when it is low water on spring tides two large bodies of iron ore are visible—one may be seen for half a mile in length, and on an average about 24 ft. in width, is yielding on assay 60 per cent. of good metallic iron, and on analysis 86 per cent. of peroxide; the lodes are running nearly east and west. Close to them is another lode, of dark-red colour, running parallel with the others, is about 21 ft. wide, and may be seen for a great length. The discovery is well worth those interested in iron making straining a point to come and see; the lodes will be visible on March 8, 9, and 11, as this is important to ironmasters in general, when good iron ore is getting rather scarce. From the appearance of the lodes there seems to be sufficient to supply the whole of the Staffordshire ironworks when properly opened.

Castellmai, Carnarvon, Feb. 29. GEORGE FRANCIS, Mining Engineer.

THE MINING DISPUTE IN IRELAND.

SIR,—In reference to the paragraph published in last week's Journal giving some account of the mining dispute between the Connorree Company and the owners of Cronebane Mine adjoining, and both situated in County Wicklow, I beg to give you herewith all what I believe to be the most reliable particulars to be obtained respecting it.

The Connorree Mine is situated to the east of Cronebane, and worked on the same line of lodes both for sulphur and copper ore. The latter ceased working about eight or nine years ago, but for some years previous to that period was not worked within 200 fms. of the Connorree boundary, during which time it is supposed the encroachments first began. After Cronebane stopped the Connorree levels were driven further west into Cronebane, and extended to the points where recent inspection by an independent agent called in for the purpose found them. I have also reason to think that unless the Connorree directors exercise great caution and courtesy in dealing with the matter legal proceedings may be resorted to.

Wicklow, Feb. 27. A CORRESPONDENT.

NARROW ESCAPES OF MINERS.

SIR,—The occupation of miners, of all sorts, is a dangerous one, and many hairbreadth escapes from death and injury have been recorded. One man is said to have fallen 40 fathoms to the bottom of a shaft uninjured; another was drawn up, unhurt, 200 fathoms by his heel, attached accidentally to a whim-kibble; another fell into a shaft from surface to the adit level, 30 fms. below, and, rising to the surface of the water into which he plunged, saved himself by getting into the adit.

On Friday last, Capt. Johns, of West Jewell Mine, and three miners experienced a remarkable escape from imminent death under the following circumstances. On the southern side of West Jewell stands Wheal Damsel, a portion of late of West Damsel, which is idle. These mines, and many others in the district, are drained by the Great Adit, sometimes erroneously called the County Adit, and sometimes the Gwennap Adit, which runs through Poldice. The manager of Poldice Mine, finding that by a choke in this adit near Wheal Damsel their mine was likely some time to be flooded, directed two men to build a dam to keep back the water, and on Friday last they were in the adit, northward from the choke, about the work, or preparing for it. Capt. Johns, directed by Capt. Josh. Michell, wished to see the position of the intended dam, and, taking a man with him, went down on that day. Perceiving that the situation of the dam was north of one of the West Jewell lodes on which the adit was extended about 70 fms. westerly, he wanted to select a site for it north of that lode, so that access thereto might not be excluded. Coming up to the level, he said to the man, "I will go in and see the lode." Just at that moment the man perceived that the water coming from Wheal Damsel was dirty, indicating some disturbance. Knowing that no person was at work in that direction, he believed that the choke was yielding to the pressure of water, and he said to Capt. Johns, "Don't go far, I think that we are in danger." Capt. Johns walked in about seven fathoms, but was called back urgently by the man, and returned to him. They then walked back to the other two men, by which time the adit was nearly full to the back. The four men then walked on, or almost swam, before the stream, till they came to a cross-cut, at the right hand, into which they went a few fathoms, and came to a shaft in Old Wheal Jewell, down which the water fell with a roar like that of the Falls of Niagara.

Thinking that the shaft would be soon filled, they climbed up, they hardly knew how, through it about six fathoms, without any ladder or rope, when further progress was stopped by a sollar or stull. Perched in that uncomfortable position for two hours, their fears somewhat subsided, because the water did not appear to rise in the shaft, but how to get down was a difficulty. If they slipped it would be into the yawning shaft beneath, and if the man highest up slipped he would force down all the rest before him. They agreed to tie together all the cords they had with them, and fastening the top end, use the line as a guide or stay in their descent. When one went down, the air being bad, the candles above went out. One of the candles was sent down by the cord, relighted, and drawn up. Fortunately they all came down safely. The next proceeding determined on was to press through the stream, now somewhat reduced, to the adit. This they did, and finding some boards they put them across the adit to divert, as much as possible the stream into the shaft, that they might have the less difficulty in getting to the footway. Thither they arrived with thankful hearts. The reader will see (whether he acknowledges Providence in it or not) that the escape was wonderful. If Capt. Johns had not taken his companion's advice to come out of the level quickly he would have been stiffed, because that level is only two or three feet high; and if they had fallen from their perch certain death would ensue.

When the two men afterwards went to construct the dam they found the water had entirely ceased to run, and they concluded that a new choke had taken place, when they declined to stop in the adit through fear of probable consequences. I may state that the accumulated water in Wheal Damsel is said to have been about 3000 cubic fathoms. R. S.

Truro, Feb. 27.

THE MINERS' WAGES QUESTION.

SIR,—Now that the question of four-weeks pay is pretty well settled, it is perhaps late to make any comments on the matter, but a recent visit to the two counties (Cornwall and Devon) enables me to offer some remarks as to the inexpediency of any alteration in the mode of paying the men employed in the various mines. From all I could learn, and from a little experience I have of mining, I have come to the conclusion that it is very evident that for a long time past great dissatisfaction has existed amongst the miners (more especially west of Truro) at the small amount of wages they have been permitted to earn, while their employers and shareholders were reaping great benefit from their hard labour. The men are not blind to the fact that the high price of metals, with good discoveries, have for many months past been productive of large profits, not only to the adventurers, but in many instances to the agents in the service of those adventurers, and it is only reasonable to infer that the men should expect to participate to some extent in the harvest. The fact that the miners have not been receiving remuneration adequate to their laborious services, or to their wants, is best shown by the returns of emigration from the county of Cornwall in the last 18 months, and the scarcity of good working men, and there is but little doubt that the time was not far distant when the discontent amongst the men would have led to severe measures being taken by them to obtain what I consider to be just between master and man—"a fair day's wages for a fair day's work." It does not matter much now with whom the four-weeks movement emanated, but it was evidently with those who foresaw the storm that was rising, and by way of make-peace between employers and employed instigated the alteration in the mode of paying the men (who are really and justly entitled to the consideration of their employers), and cajoled them into the belief that the amendment is made for their benefit, whilst if the truth be told it will actually be for the profit of those who, as a rule, are well paid, and in some instances for those whose means and position should place them far above rat-

ing any advantage, at the expense of the shareholders and their under servants. For my own part, I cannot see that the men will in any way be gainers by the movement, inasmuch as let a miner's wages have been what they may the last twelve months, we will say, he may rest assured he will get no more in the next twelve months, although the payment of his wages may be distributed over thirteen payments. In other words, assuming a miner has been receiving his 3*l.* 10*s.* per month for twelve months, which is equal to 42*l.* per annum (which I am afraid is much above the earnings in the Redruth and Helston districts, where the most profitable mines are being worked) he will earn or receive no more than 16*s.* 2*d.* per week in the next 52 weeks, so what benefit the men will derive I am at a loss to perceive.

Of course there are mines in these districts where the men may be allowed to earn a better rate of wages, but they are the exception, not the rule. With regard to engine-men, carpenters, and smiths, who have hitherto been paid by the month, they will most assuredly labour under a sad delusion if they think that they will receive their present monthly pay 13 times in the year, and the sooner they disabuse their minds of such belief the better. Whether the purse-strings and agents of the mines will take their pay for 13 months in the year remains to be seen, but I have not heard as yet of anyone leading the way in conceding the "manufactured" month, or of any action being taken by shareholders to determine the question. The whole question appears to me to resolve itself into this—the men are dissatisfied with their limited earnings, and by way of smoothing them over they are led to believe that the new system of payment will be a great boon to them, and that the agents, as an equivalent to the concession, are to receive 13 months' salary in the year. It is not a question of more frequent payment of wages but of more money which the men require, and the time is not far distant when the shareholders themselves will have to well consider the matter, otherwise they may find to their cost that unless some remedy is brought into play to ameliorate the condition of the men they may expect to have to bear all the disagreeables attendant upon a turn-out on strike, the consequences of which no one can foretel.

My remarks must be taken not so much to apply to the mines east of Liskeard, as I am informed that the average earnings of the men employed in most of those mines is equal to about 4*l.* per month, and that until the four weeks' agitation commenced in the West not a hint of a desire for a change in the system of pay had ever been made manifest. MORE PAY.

PAY THE MINERS IN CASH.

SIR,—While the "Mazed Monday" is causing so much commotion at St. Just, it is pleasing to see that in other parts of the county steps are being taken to destroy the means which lead to it.

Hitherto it has been customary throughout the county to pay the miners in pares of six or eight men together; take for example a pare of eight men who have earned, say 4*l.* 7*s.* 6*d.* per man, making in the aggregate 35*l.* These men in the general way would be paid 35*l.* in notes, and frequently with the notes of banking firms whose establishments are many miles from the mine. Now, before these can separate and each man take his earnings to his home, these notes must be changed. In most cases the bank would be closed before they could reach it, and at the same time there is change kept at the public-house to accommodate the men. As a matter of course, the men go to the public-house to change their notes, and are thus brought into contact with drink, which they soon acquire a craving for, and are not content to have a good drink on the pay-day, but must have another turn at it on the following Monday, "Mazed Monday." This system is the more to be regretted because many are unwillingly compelled to drink, inasmuch as their notes must be changed, and the landlords will only change to customers. Although this shows the origin and main support of the "Mazed Monday," it is pleasing to be able to add that the amount of drunkenness is much diminished of late years, and if our pursers would pay the men in cash, so that they could divide their money, and each man go to his home with his part, thousands of miners would not go into the way of temptation to drink, and drunkeness among them would much further diminish.

I am glad to say that in some instances the pursers are beginning to see this. The last two pays at North Roskear and Wheal Buller Mines have been paid in cash by Mr. Thomas Pryor, of Redruth; and at the last Pendarves United pay this good example was followed. Pay the men with cash, and the "Mazed Monday" will soon disappear. —— DYNAMITE.

NORTH TRESKERBY MINE.

SIR,—I am glad to find that spirited operations are about to recommence in this mine, an 80-inch first-class second-hand engine, with boilers complete, having been purchased by the manager, Capt. R. Pryor. The company wisely deferred incurring the expensive operations necessary for a full development of the eastern ground until they had secured an extension of their boundary in that direction, which, through the reasonable intervention of the lord's intelligent agent, Mr. Downing, they have now secured. This would have been secured much earlier but for the conduct of the late purser. I am much pleased to find that an important discovery has been made in the sett, and I am told that in a short time this mine will be ranked with the best mines in the district. It is the only mine in the locality that has survived the change of circumstances in those which surround it. But a revival is now taking place. Great Wheal Busy having been taken in hand by a rich company, who will avail themselves of the large reserves left by the late workers. Wheal Daniell is also at work, with good prospects of success. S.

HARMONY AND MONTAGUE.

SIR,—Your correspondents, in reference to this mine, are not sufficiently well informed in its history to be able to give the public a clear account of its brief career. With your permission I will supply the want, and I do so entirely in the interests of sound mining, which is to no small extent injured by some of these doubtful undertakings.

The Harmony and Montague sett was worked formerly for copper, until drowned by the stoppage of Tolgus and other heavily watered mines. Associated with the copper are certain tin veins of fair size, but producing a low grade of ore. These veins have been turned over above the adit level by various parties of tributers since the stoppage of the copper mine, and nothing of value remains above the water level. In this condition of affairs the mine happens to be brought to the notice of Mr. Thos. Spargo, who formed a limited company with the supposed intention of working it. The requisite seven having been collected, they met in solemn conclave and resolved:—

1. That the capital of the company shall consist of 64 shares of 50*l.* each.
2. That Mr. Spargo shall be manager and director.
3. That a sum of 2176*l.*, or thereabout, shall be paid to Mr. Spargo as promoter, leaving 1024*l.* for the working capital of the company.

The moderate capital and glowing description of the thousands of fathoms of levels cleared and ready for stoping the tinstone, which at different times appeared in the *Mining Journal*, enabled some one to sell many shares at a premium. One gentleman, the purchaser of ten shares, visited the mine; he saw some tinstuff on the grass, he heard of this vein and that vein, he heard also of an engine agreed for, and thus formed a very favourable idea of the capabilities of the mine; he was, however, asked to lend money for the completion of certain purchases without any reference being made to the necessity of obtaining the sanction of the shareholders, and in one or two ways he was led to form grave doubts of the management. What, he asks himself, has become of our capital of 3200*l.*? Being an energetic man, he soon compelled Mr. Spargo to call a general meeting of the company. Assembled together, and going over the minute-book, the new shareholders found their capital voted away from them, and heavy accounts due upon the mine. Some hard things are said to Mr. Spargo, and he is requested to disgorge.

There is yet faith in the mine. He extracts from Spargo some 500*l.*; most unfortunately condones past proceedings; elect a new directorate, and hopes that the mine will put things straight. Capital is, however, wanted, and must be had. Before asking the public for this, will it not be well to be *quite sure* our mine is a sound one? A member of the board, him-self an engineer, volunteers to examine the mine along with a Cornish captain of good repute. The examination is made. The tinstone on grass is found to be unsaleable, buyers will none of it That in the mine is of the same character. What little of good stone there was has been removed by the tributers. The thousands of fathoms of levels shrink to tens. There is evidently nothing above the adit to find the many years supply promised; whilst beneath the adit there is the sure prospect of the heaviest and most expensive pumping. The fact was evident. We had spent our 3200*l.* on a squeezed orange. What course could henceforward be taken other than to let—nay, rather to hasten—interment by the undertakers of the Stannaries Court?

Feb. 27. —— AN EX-DIRECTOR.

HARMONY AND MONTAGUE.

SIR,—In the Journal two letters have appeared, one signed "A Shareholder" and the other "Another Shareholder," both of which reflect upon me in connection with the Harmony and Montague Mining Company. I confess I perused the second letter with the greatest astonishment, because that portion of the press which is acknowledged to be respectable makes it always a rule to exclude from their columns correspondence and remarks on any case which is before a Court of Law or Equity. How much more might I not expect such justice from you, when the real or assumed shareholders made anonymous attacks, and when you were thoroughly cognisant of the fact that the company is in course of liquidation in the Stannaries Court? Under such circumstances, it is not my purpose to vindicate myself until the Court has given its decision, when I may have something to say which will be proper, pertinent, and opportune.

It is desirable, however, while I protest against the impropriety and injustice of your allowing the psuedo shareholders to attack me in your columns, that I should call your attention to a few particulars. After the case has been heard I shall feel myself at liberty to discuss the whole matter, if anyone who does not skulk under an anonymous signature, and whose position deserves attention, should demand it.

In the first place, I deny holding out any prospects in connection with this mine, or giving any description of the property, other than making reference to the letters and reports of mining captains and engineers, which were actually printed in your columns.

The dates of the reports referred to were March 28 and April 5 and 27, May 11 and 25, June 1, 8, 15, 22, and 29, July 6, 13, and 27, and August 3, 10, and 17, by Capt. Hugh Stephens; April 19 by George Henwood, M.E.; May 10 by Captain Michell, besides reports from Capts. Peter Floyd and James Pope, which were circulated amongst the shareholders, but I think not published in the Journal.

As to the management, and the quality and character of the business transacted, the books are now in the hands of the Court, and they will express the real condition and progress of the affair.

The statements made by "Another Shareholder" as to the amount of money drawn from the shareholders, and the actual amount expended, I pronounce it to be a palpable and unqualified falsehood. This I do from the evidence produced in Court, the opinion expressed by the Court, and all the known facts of the case.

As to the meeting at the London Tavern, the resolutions passed prove that the directors who were appointed took the management into their own hands entirely. They employed men, and did not meet their wages; and, I am now informed, paid merchants' bills in preference to labour cost, the immediate payment to the merchants not being requisite, showing their utter incompetency in this, as in various other particulars, to manage a business of that nature.

It was on Sept. 13, 1871, that the directors assumed the management. The works were proceeded with at a rapid rate, and hundreds of pounds expended with merchants, the particulars of which were never furnished to the secretary. It was no business of mine to say whether the mine was worth working, or to give any opinion about it whatever, when I ceased to have any official connection with it. Besides, as I have shown, and you know, it had been reported upon by some of the highest authorities in Cornwall.

In the meantime it is not too much to require two things—that your columns shall not be open to anonymous slander, either of me or anyone else in connection with this matter, and that these observations upon the aggression perpetrated upon me shall have the same medium of publicity which you permitted to the calumny itself.—*Gresham House, March* 1. THOMAS SPARGO.

VAN CONSOLS LEAD AND BARYTES MINES.

SIR,—In reply to Mr. Cooke's effusion, I am glad to say that the great discovery of lead at Van Consols Mine has engrossed so much of my attention that I have not time to bother with his silly remarks; perhaps he will know more about mining when he has forgotten his nursery rhymes.

Van Consols, with a lode worth 40*l.* per fathom for lead in the back, end, and bottom of a 25 fm. level from surface is, I think, a complete answer to all the nonsense that has been written about "Grit Bands," &c. Why, no *miner* would have a mining sett without such grit bands—*i.e.*, without elvan-courses, cross-courses, &c., for without these so *mis*-called disturbing causes there would be small chance, if any, of finding lead. I say again that it was as *absurd as it was untrue* to say that the great lode at Van Consols was cut out. I shall not trouble myself to answer any more letters from Mr. Cooke.

Pinner's Hall, Old Broad-street, March 1. MATTHEW GREENE.

VAN CONSOLS MINES.

SIR,—I notice the columns of the Journal for the past three weeks contain various letters relative to this mine, but it is clear to me that most of the authors are not conversant with the composition of this immense lode, the strata which it traverses, or the disturbing causes alluded to. I fearlessly say it is a continuation of the Van lode and no other, which may be traced from east to west for miles without deviation of compass.

I shall now refer to the future of this mine. The company have virgin ground in the eastern part of their grant fully half a mile in length, and no disturbing cause presents itself to annihilate or even interfere with the lode. At the eastern extremity of the sett a narrow band of gritstone crosses the lode about the boundary of Penyclyn, the abandoned mine referred to in some of the correspondence, which I am proud exists, inasmuch as my experience in mining here has taught me to expect good bunches of lead ore being deposited against them. Our 25, west of Little's, has been driven 8 fms. from shaft, the last 5 fathoms through orey ground. We are now driving on a portion of the north part of the lode, about 7½ ft. wide, which is worth to-day fully 40*l.* per fathom for lead ore, and indicates a continuance of it for a great length, with back and bottom of level equally productive. We are clearing the deep adit east by the side of the lode, and when the end is reached shall have some 30 fms. of it to cut down, which in several places picked into we have taken out solid stones of lead and blende, which is associated with fully 2 tons per fathom of superior carbonate of baryta, therefore I fully anticipate a continous course of ore between both levels for a great length, and upwards of 50 yards in height. Our prospects are all that can be fairly desired. No impediments have ever been placed in the way of inspections. Shareholders and public investors may rely upon the accuracy of my reports on the day on which they are written.

I consider that Capt. Lean's letter of Feb. 24 gives a lucid description of the influence of bands of gritstone crossing the great trunk lode of this locality, hence I need not further comment on them. If the north or hard part of the lode is still standing in Penyclyn the chances of success there are great, and under the supervision of that gentleman will no doubt benefit the company he represents.

Feb. 27. JAMES ROACH.

PRINCE OF WALES MINE.

SIR,—To judge by the price of the shares this mine is in bad odour on the market, for whereas a few months ago transactions were noted as high as 36*s.*, with a brisk business, now only between 16*s.* and 18*s.* is the range, with a difficulty of business. Yet, the financial condition of the mine is improving, and the profit and loss account of the next meeting already indicates a much more favourable result than on the last occasion. The four months to Dec. 22, 1871, were closed by a loss of 461*l.* Since then, however, two sales of copper, aggregating 260 tons, have realised 1671*l.*, to which will be added tin sold Dec. 21 378*l.*, and carriage (say) 40*l.* These sums added to the balance carried forward, 203*l.*, give a grand total of receipts of 2292*l.*; and, if costs and bills and dues are as heavy as in the last account period, they will be 2076*l.*, and there will be a profit of 216*l.* instead of a loss, as before. In this calculation no reference is made to either silver ore or tin, beyond the last sales, and this state of facts should encourage the holders of shares to support their property by retaining their interests in an improving concern.

This absence of information in regard to either tin or silver is a reflection on the management. There cannot be too much openness in mining affairs, and where it is necessary to mine for information like ores in granite country suspicions arise which keep the shareholders in a continual perspiration of excitement and uncertainty. The agents of the mine must be fully aware of the great interest which attaches to both the subjects, and how anxious the shareholders will be for constant information on the progress of what have been regarded as most important additions to the property. Yet, week after week passes without a word of notice. The silver department, which yielded 723*l.* in one three months' account, has now come to almost nothing, and the change is regarded as a matter of course. No anxiety is displayed, no explanation is afforded, no opinion is expressed whether the thing is gone forever, or likely to be resumed; and, if so, how soon and under what conditions. There can be no doubt that the agents would consult the first wishes of shareholders by saying something in their weekly reports on these matters, and the more complete their statements the more will they redound to the credit of those who make them. The present course of conduct goes far to justify the complaints that have been made, and if continued will add weight to those complaints, and engender so wide-spread a dissatisfaction as to provoke a change. —— COPPER.

LLANARMON LEAD MINE.

SIR,—The opinions entertained by a "Llanarmon Shareholder," in the Supplements to the Journal of Feb. 10 and 24, are shared by others equally with himself. The long silence maintained after each announcement of progress engenders in the minds of some a suspicion that the glowing reports, which now and then reach us like a meteor-flash, of anticipated improvements have not been realised. This I know, from what I hear, acts prejudicially against the best interests of the property, and might easily be obviated by a monthly if not a weekly report of the progress made in the Journal. Æ.

Chippenham, Feb. 26.

BWLCH CONSOLS.

SIR,—I find by the two last Journals that neither tho secretary or the mine captains have condescended to offer any reply to my letter which appeared in the Supplement to the Journal of Feb. 10. I am, therefore, right in presuming that silence gives consent, that 3*s.* out of the 5*s.* call is absolutely required to pay the agency of this mine. Such being one of the cases of extravagance now going on there, I, as a shareholder, am dissatisfied with it; I should, therefore, like to put Mr. Peter Watson's assertion to the test, when, at a meeting when the first dividend was declared, he said the accounts were drawn out to perfection, and ought to be a pattern to all other mining secretaries. If they are so perfect, Mr. Battys, our secretary, can have no objection to give us, through the medium of the Journal, the full particulars of the following items now entered in the published accounts:—London office expenses, 172*l.* 17*s.*; agencies, 341*l.* 5*s.*; mine office expenses, 39*l.* 5*s.* 8*d.* After these are obtained I may have something else to draw the attention of my brother shareholders to.

Prolleli, Feb. 27. —— A SHAREHOLDER.

GREAT ROYALTON MINE.

SIR,—In last week's Journal I observe a letter from Mr. W. J. Thompson respecting this mine, and containing the following statement:—"The men were discharged and the engine stopped, not to give me time, as liquidator, to wind-up the company, but because the largest shareholders were not content with the London management, and they wished to place their affairs in my hands for investigation, with a view to reconstruction as a limited company."

To this statement I must give a most unqualified denial. At the last meeting of the adventurers it was decided to wind-up voluntarily, with a view to reconstruction under the Limited Liability Acts, and Mr. Thompson was simply appointed liquidator. In accordance with this decision I myself gave the orders for the stoppage of the works, to prevent further costs to the adventurers, who, owing to the inability of some of their co-adventurers to pay calls, were not prepared to incur the outlay for additional stamps. No compliant was made respecting the London management, nor was Mr. Thompsen authorised to make any "investigation" beyond that nece-sary for his duties as liquidator.

I shall be obli ed by the insertion of this letter in next week's Journal.

1, *Finch-lane, Feb.* 28. —— JAMES H. CROFTS.

TERRAS MINE, AND THE BROKERS.

SIR,—I fondly hoped, after prostrating my powerful and wily antagonist, Mr. Marlborough, I had done with defending my noble craft (Terras) from shipstuking pirates. But to my surprise my worthy correspondent, Capt. Charles Thomas, is down upon me. I confess it made me scratch my head and look grave to have to combat his (apparently) strong reasons in garbling his report, and to a trivial observer it would appear I was driven into a corner, but I will try Scotch logic against English yet, and let your readers see whether I make an honourable retreat or not.

So to my tale. When Capt. C. Thomas sent me his report a year ago I gave the report, as I got it from him, verbatim, and I say again his report and observations as to the financial position of the mine may be true to the very letter, but a year tells tales on a mine. Terras a year ago had no engine erected, and only 48 heads of stamps. Possibly the contractor might not see his way clearly as to funds to erect more stamps, sink the engine-shaft deeper, get more dressing-floors, and other &c.'s, to carry on the mine, and bring the craft into the golden harbour. But Terras can now afford, with a smiling countenance, to say "Look at me now; see yon powerful engine to drain Edwards's and other lodes, and look at the new powerful stamps, one as good as 10 or 20 of the old useless kind; and, on the whole, I am not the Terras now that I was a year ago, hence why should I fall back on a report a year old, so far as my financial position is concerned, and the lodes and elvans are evidently improved." Now, in plain English, why should I refer to what Terras was a year ago? I must honestly say Capt. Chas. Thomas rather sides with Mr. Marlborough, and shows a little leaning to the trade, by supposing that the real issue between Mr. Marlborough and the promoters is relating to the Limited Liability Act. To this I say bosh; and, in my Scotch way of thinking, is a mere decoy duck to serve a selfish purpose—to try and frighten timid adventurers to suit the dealers. I have taken farewell of Mr. Marlborough for ever. He is like the village teacher—though vanquished can argue still. I am too far North for him. Let me tell him again that he offered me 500*l.* for the loan of 500 shares till June, and then I was to get them back for 21*s.* Had it been an Edinburgh broker who made me such a proposal I would have urged his friends to send him to Morningside—a place fitted up for people who are light in the upper story. In conclusion, I have a high respect for Capt. Chas. Thomas; and as he really would take nothing from me for his valuable report, if I am spared till jolly Christmas I will send him a fat goose and a good turkey, which are prized in merry England at such an enjoyable season.—*Ormiston, Tranent, Feb.* 27. J. ADDISON.

OTTOMAN MINING COMPANY.

SIR,—As I do not know many of my fellow-shareholders in the Ottoman Mining Company, will you allow me, through the Journal, to suggest to them to come forward, one and all, and support the directors? The mine is doubtless a good one, and will pay eventually, and is now sending ore to market. All that is required to make it a paying concern is about 4500*l.* The company is a limited one, and, therefore, unless the shareholders come forward willingly at once it must be wound-up, circulars having been forwarded to this effect. Was there ever such a suicidal policy as to allow it to be wound-up with such good prospects? There are 70,000 shares issued; this includes the 35,000 to the vendors, Swan and Co., whose interest, one would think, was to keep it going, unless they have ulterior views. Well, supposing each person subscribed 2*s.* for every share he holds in the company. This would be fair and even enough, and make the sum total 7000*l.*, the half of which, I believe, will more than answer to bring it into a dividend state.—*London, Feb.* 26. —— A LARGE SHAREHOLDER.

OTTOMAN MINING COMPANY.

SIR,—Will you oblige me by allowing this letter to appear in the next *Mining Journal*? I have just seen the secretary, Mr. Carpenter, and he tells me that 2000*l.* is all that is required to put the Ottoman Mine in a paying state. Now, surely the shareholders are not going to allow their property to be sacrificed for this small sum, when they have 70 tons of ore coming home, and hundreds of tons in sight ready to be shipped. As Mr. Carpenter truly said, "You cannot expect the directors and one or two shareholders to supply their money for the benefit of others; it is better for them to stop the mine, and then purchase it themselves," which, doubtless, they will do, as no one is likely to offer for it except those who know it, and then all the rest of the shareholders will lose their money, as one director has 6000*l.* in the mine and another 3000*l.*, so I understood. Well, of course, if the shareholders as a body will not support the directors, why they will naturally stop the mine; it will then be sold for next to nothing, and which the gentlemen so largely concerned will purchase for themselves, as it is sure to pay in the end.

Now, supposing every small shareholder doubled his stakes: those that have upwards of a hundred shares pay 2*s.* on each share, or (say) the whole 40,000 shareholders subscribed 1*s.* for each share they now hold. This would make ample funds, and the mine would doubtless pay dividends shortly.

As I do not know the names or addresses of my fellow-shareholders, I trust you will allow this to appear in the Journal. A. H. H. MERCER.

Manor-road, near New Cross.

OTTOMAN MINING COMPANY.

SIR,—Please grant me a small space in your next paper for the benefit of the general shareholders in the Ottoman Mine. If they will not come forward unanimously to subscribe the small sum necessary to place the company in a paying condition, I would suggest that on no consideration should they allow of its being voluntarily wound-up. Let this be done in the legitimate way through the Court. In either case they may be sure they will get nothing returned to them; but in the public way they may be sure of everything being done above-board. In the case of a voluntary winding-up, a few interested persons secure the mine for next to nothing for their own benefit, and after having formally disposed of the poorer shareholders, the mine will be found working with profits. This has been the case in one mine in which I was interested, and so I hope the shareholders will make a stand against it; but the proper thing in this case is, doubtless, to subscribe. —— A LADY SHAREHOLDER.

ST. JOHN DEL REY MINING COMPANY.

SIR,—I am sorry that no satisfactory reply to the letter in the Supplement to the Journal of Feb. 17 of "An Anxious Shareholder" in the St. John del Rey Mining Company has yet been given. I certainly cannot accept as such the letter signed "F. J." in the *Mining Journal* of Feb. 24, as having as little sympathy with "ecstatic bulls" as with "anxious bears," I desire only hard facts. If all is really so *couleur de rose* as "F. J." represents, why have the summarised mail reports always previously supplied to the daily journals been suppressed for the last two months? Again, how can "F. J." state that the produce now pays all expenses, when he must know that so lately as last Nov. the loss on that month's working alone was upwards of 570*l.*? He says, too, how truly I do not know, that "no suggestion was made at a general meeting that the shafts were not being sunk in the right positions;" but can he deny, that whether suggested there are not, this opinion is almost universal among all who are practically acquainted with mining in Brazil? Can he deny that it is also the opinion of such that both the estimated time and cost of sinking the remaining 104 fathoms must be at least treble those named by him, and will only too possibly be much more?

Feb. 28. ANOTHER SHAREHOLDER.

P.S.—The costly palliative of the late loan of 30,000*l.*, at 7½ per cent. may delay, but I fear cannot prevent, the call looming in the not distant future.

[For remainder of Original Correspondence see to-day's Journal.]

COAL MINING IN NORTH WALES.

The collieries in the northern part of the Principality are now very fully employed, the demand being in excess in many instances of the ability to supply. It is not a little singular that with a decrease in the number of collieries there has been a large increase in the production. Thus, whilst in 1869 there were 65 collieries, which produced 2,155,180 tons of coals in 1870, that number had fallen to 53, whilst the output was 2,329,030 tons. The districts around Wrexham and Ruabon furnish fully two-thirds of all the coal that is raised in North Wales, and Flintshire nearly the whole of the remainder, as but a trifling tonnage is got at one or two small pits in Anglesea. The cannel coal at Coppa and other places is in great request for oil-extracting purposes, whilst of the ordinary qualities a good deal is taken for locomotive purposes and sent to Chester, Birkenhead, and also shipped to Ireland.

At Aston Hall, near Hawarden, the colliery is now being developed, and it promises to become a profitable one. Mr. Gladstone, the Prime Minister, is the lessor of the minerals. They are working a 5-ft. and a 3-ft. seam, whilst in connection with the coal is a valuable bed of clay. The latter is worked up into bricks, tubes, &c., there being very extensive machinery, sheds, and drying rooms for the purpose. At present a railway is in course of construction from the colliery to Queensferry, by which the coal can be put on to the Holyhead and Chester and the Wrexham and Connah's Quay Railways, and also shipped on to the Dee.

The South Buckley Colliery is kept fully going, and the company have put a branch on to the Buckley and Connah's Quay Railway.

The Little Mountain Colliery has been one of the most successful in the district, has a good contract for railway coal, and is now doing an excellent trade.

The pits near to Queensferry are now working most satisfactorily. The proprietors of the Eleanor are now doing well, sending a considerable tonnage of coal from the ferry to Dublin and other parts of Ireland. The Queensferry Company are also doing a brisk trade.

Bagilt, midway between Flint and Holywell, is noted for having about the finest shaft in the kingdom, being fully 20 ft. in diameter, clear of the tubbing. The coal was reached some time since at a very great expense, owing to the difficulties that had to be encountered, especially water and shifting sand. It is known as the Battersfield Colliery; but despite the cost of sinking, it is now standing. The Bagilt Colliery has closed, the coal having been worked out, but the machinery is still on the ground.

The Mostyn works and pits are going on very satisfactorily. One of the newly-erected furnaces is now in blast, and another one it is expected will be ready very shortly. A good deal of the ore is brought from Santander, in Spain, whilst some is obtained at a place called Cwm, some eight miles from the works. The coal raised includes what is known as the Five-yard seam. There are, however, several valuable beds of coal capable of being profitably worked, the area being large, extending for a long way under the bed of the river Dee.

In the Mold district the collieries are all very busy. A new shaft has been opened out at Tryddyn Vale, and machinery and boilers put down. The coal to be worked is the cannel, for which the neighbourhood of Leeswood has been long noted.

The Coppa Colliery, one of the finest in the locality around Mold, now the property of a limited company, is being actively worked, a considerable tonnage of excellent cannel, as well as other coal, being raised.

The Oaks Pits are drawing something like 500 tons a-day, and sending by railway to Chester, Holyhead, &c.

The Argoed Colliery has been taken by a London company, and preparations are being made for doing an extensive business. A pair of new winding-engines and a pumping-engine have been completed, and operations will be pushed forward with vigour. Mr. Boosey, we understand, has been appointed manager.

At Bronwhyllfa a fair tonnage of coal is now being raised, but work will shortly be carried out on a more extended scale. They are now sinking two shafts to the cannel coal, so that when they are completed the output of all the pits will be very considerable.

The extensive colliery near to the town of Wrexham, the sinking of which cost upwards of 100,000*l.*, and where there was an inundation of water some time since, is now looking in a healthy state The water has been cleared, the conductors are being put in, and me

are driving out. The usual railway facilities have been made, and everything is being done for the doing of a very large trade, so that the colliery promises to become one of the most important in the district.

The Ruabon district, noted for its coal mines, some of them being very large, is now doing well, the greater part of the produce going over the Great Western Railway. In the same locality a considerable tonnage of ore is raised, argillaceous carbonate and brown hematite, in connection with the coal measures.

Attention is now being directed to the number of collieries in the neighbourhood of Ruabon that are standing owing to the water. It appears that about a mile to the west of Ruabon there are the Garden Lodge, Wynn Hall, and some portion of the pits of the new British Iron Company all abandoned. That water can be overcome in our mines admits of no question, and in scarcely any district in England, with the exception of Staffordshire, is it allowed to obtain the mastery. That valuable collieries like those we have alluded to should be allowed to stand, now that there is such a demand for coal, must, one would think, be in consequence of their position not being known, for there appears to be no lack of capital for mining ventures, and North Wales is now becoming a better favourite for investments in minerals than it has been for some years previously.

The extracting of oil from coal is being prosecuted vigorously, the cannel of North Wales being of a very oleaginous character. Near to Mold Mr. W. N. Marston has a large number of retorts at work, not only extracting but also refining the oil. The ironworks, more especially those engaged in mining machinery, boilers, &c., are all very busy. At Hawarden the Messrs. Radcliffe are actively engaged in engines and boilers for some tin-plate works at Swansea, and winding gear for slate quarries at Carnarvon.

Royal School of Mines, Jermyn Street.

[FROM NOTES BY OUR OWN REPORTER]

LECTURE XXIV.—A moment's consideration (continued Mr. SMYTH) will show that the work of ascending and descending deep shafts, and travelling perhaps for miles along the levels of the mines, must occupy a considerable time every day, and must also, more or less, consume some of the strength and power of the workmen. In the earlier days of mining, when the deposits to be worked were nearer the surface, the matter was not of so much consequence, and in those days, and even now in mines conducted on a very small scale, contrivances of a very inefficient character are frequently used. If the depth is small, and the mine is worked by a downcast, access to the bottom is gained by a succession of stopes or steps. Many iron mines in this country are so arranged that a few steps will suffice to get down to the work and back. There is also another plan, no doubt derived from that, by which steps are cut in the rocky floor of the vein, sometimes throughout the plane of the lode itself, or in the conterminous rock; and there is a convenience in this plan when it is desirable to introduce horse-power, as the steps can be made sufficiently broad, and of a moderate height, so that horses may be trained to walk up and down. At Mostyn Mine, Flintshire, this is a very frequent practice; as it is also at lead and salt mines in various parts of the kingdom. This is a matter which depends a great deal upon the depth, an increase in which has led to considerable modifications of the plan in the Alpine salt mines, where the steps are cut with slopes between at a moderate angle. In these mines there are inclined shafts, with steps on the side made of pieces of timber at each step to tread on, but having also at the sides a couple of rows of rounded pine timber upon which the miners slide down in a sitting position, shooting to the bottom with amazing velocity and perfect safety. With regard to those vertical shafts which are ascended by ladders, the smaller lead mines of the North of England use very rude methods of descent, and in many cases, in other parts of Britain, it is effected by a number of pieces of wood, projecting from the sides of the shaft, driven in between the stones of the walling. Considerable inconvenience attends this plan, as there is often a strong draught, which may extinguish the light carried by the person descending, and then, if two or three of these pegs are worn or knocked away in succession, the miner is exposed to great peril. This plan is, however, only used in mines on a small scale. In some cases stemples are used, being placed across at 4 ft. asunder, sometimes parallel, and sometimes transversely. In winzes, where they are not more than 2 or 3 fms. long, these are very suitable, and thus the men climb up and down by the help of a cord, instead of by regular ladders. A sort of acrobat work, which leaves its effects on the muscles for some days. These stemples allow a firm hold, but when they are placed where the depth is 40 or 50 fms. it is very hard work, and they are so large for the hands that those accustomed to a good ladder will not approve of them. The ordinary means of descent in most properly managed mines are ladders when machinery is not employed for lowering and drawing out the men. Ladders of the simplest forms are those in use in America, Hungary, and in some parts of the North of Europe, and it is a kind the most advantageously employed when blasting is going on, and when smaller ladders would be broken. They are made of a strong beam of wood, in which steps are cut at proper distances. Another sort, like a poultery ladder, is very often used. It is not, however, recommended where there are a great number of men. It is constructed by strips of wood being nailed across an upright beam, and placed against the sides of the shafts for a considerable height. Special care should be taken to secure the cross-bars to the beam. The staves of the ladders in Saxony are usually flat, and are put through holes in the side pieces. In this country they are usually round, and made of ash with, at the distance of every 10 or 11 ft., a strong wrought-iron bar, which holds the ladder firmly together. Iron bars, however, are not as a rule advisable, and in winzes and places not often travelled through they will sometimes be found to have utterly perished, so far as strength is concerned, nothing being left but a mere crust. The distance between the staves, too, is to be considered. If they are as close as those on bricklayers' ladders no one will like them. It is usual to have them from 10 to 12 in. apart, and 11 in. is found generally to be the best space. Sometimes ladders are made of chains, they being more easily raised, and conveyed from place to place. The most important thing, however, is the manner in which they are placed. In the principal part of the extensive metalliferous mines the ladders are placed from one platform to another, a system largely used, with different variations. In an inclined shaft it is convenient to place the ladder along the footwall of the lode, but not close to it, so that any rubbish falling may pass through it. The ladder should be put at an angle easy to climb in vertical shafts, although a great deal depends on the size of the opening. A great number of mines have the ladders placed so badly that where there were considerable distances to climb the health of the men is seriously injured. The worst ladders are those resting uprightly against the walls of a shaft. An ascent and descent of 50, 60, or 80 fms. every day upon a perpendicular ladder is found to affect the heart and lungs very powerfully and injuriously, besides the risk of instantaneous death by missing hand or foot hold. The proper angle is about 75°, which a man in good health can easily use without much danger. Where the shaft is perpendicular a system of sollars is used, by which the descent is divided. Each sollar has a man-hole, with a trap-door, so that a man would not have a fatal fall in case of accident. In several localities on the Continent very short ladders are used, not being more than 2 fms. in length, and each sollar guarded with sides. In other places 4, 5, or 6 fms. are common. The ordinary run of English mines have 20 to 40 fms. for the prevailing lengths. These longer lengths, however, are all more or less fatiguing, and in the deeper mines the average life of miners is shortened in consequence of this as much as by the bad air they breathe, so that many plans have been proposed to get rid of this labour. One of the first attempts to meet the difficulty in this country was by raising the men by means of the same rope and chain which raised the mineral, but it was found so full of risk that the proposal (and in metalliferous mine especially) was not received with any satisfaction. It is found, from comparative statistics, that there were more accidents when the men were raised by rope or chain than before, and it is wonderful they were not even more numerous. In Belgium, for instance, the accidents in one year when ladders are used were only 1 in 2665; while at Charleroi, where ropes and chains are used, the number of ascents and men being equal, the fatality by accidents were as many as 1 in 1153, or more than double. At last in the Hartz mines a discovery was made leading to a new method, which came into use in 1839, and solved the difficulty, while our miners in Cornwall were close at their heels, and originated the very same thing. This machine, which is called the Fahrkunst in Germany, was put up in the Treseaven Mines in 1842, and the inventor received a prize offered by the Polytechnic Institute of Cornwall for this great improvement, by which the men are lowered and raised without taxing their physical powers. The importance of the change will be obvious if we consider the actual loss to proprietors of work (let alone the wear and tear of the men), as it often takes ½ or ¾ of an hour to go down and to come up. Let us suppose 600 men are employed, and have to descend 1200 feet to their work, and that each man weighs 120 lbs. Each man will have, of course, to lift his own weight, and, therefore, the whole will lift 600 × 120 × 1200 = 86,000,000 lbs. To raise one million of pound a foot is a good day's work for a man, so that there is lost the work of 86 men. Taking each man's labour as worth 3s. a day, that gives a total of 12l. 18s. loss in money value per diem, or for 300 working days in the year 3870l. per annum is lost. This is a sum large enough to put up a steam-engine and raise and lower the men by machinery.

The apparatus thus found to be so serviceable, and which, as I have said, is called the Fahrkunst in the Hartz, is called the man-engine in Cornwall, an unsatisfactory name, but it means the same thing. The idea was hit upon in a similar manner both in the Hartz by Mr. Oppenheim, and in Cornwall by Mr. Lewis. Watching the action of the pumping-rod, the two observers conceived the idea that by making a foothold on the rod the miner would be drawn up as much as the length of the stroke at each stroke, when he could step off on to a platform, and then on the rod on the other side, which would just have completed the down stroke, and would be ready to ascend. At first it was intended that only a few men should ride in this manner on the pumping-rod. The shaft being all open and unprotected it required a good deal of nerve to step across the yawning abyss, but eventually it was found so advantageous that arrangements were made to carry all the men; and at Mansfeld, in Prussian Germany, a plan was adopted by which the platforms nearly touched each other, so as to avoid this danger. In Cornwall the ascent and descent is made in a similar way, but independently of the pumping-rods, by what, as I have said, is called by the miners here "the man-engine." The simplest form is that used in Cornwall, but double-action machines are now common in Bohemia, Saxony, Belgium, and almost all the northern mines on the Continent. In England a great improvement is made; instead of two rods a single rod is put in, the steps being 2 fms. apart, and at correspondsng intervals sollars are, constructed which the steps all but touch. It makes about eight strokes in a minute, and 12 ft. at a stroke, so that the rate of ascent or descent is 72 ft. in a minute. The expense of this single-rod system is not considerable; and wherever a shaft is 150 fms. deep or more a man-engine should be put in. There is good reason for believing that this mode of conveying the miners up and down the shaft is in the end a great saving to the proprietors of the mine, to say nothing of the great boon it is to the men, getting rid not only of the inconvenience of climbing, but conferring upon them many more years of health and usefulness than they formerly attained to. Thus the man-engine is a great advantage to all persons concerned, and ought to be introduced in all cases where the shaft is 150 fms. deep or more. Most admirable machinery of this kind has been put up by M. Warocque, at his colliery at Mariemont, where the step is large enough to accommodate two persons at once, and so well boxed in that all risk seems to be removed. It is placed in an elliptical shaft, and every day 700 persons go up and down without any sort of fatigue. It is rather expensive, but as four collieries have access to that shaft it is looked upon as a great boon.

CRYSTALLISATION OF METALS.

Dr. J. M. Gladstone, F.R.S., began his discourse at the Royal Institution by referring to the formation of the lead tree as one of the oldest experiments in chemistry, and to the principle involved in it—the replacement of one metal by another in solution—as the type of chemical reaction. Thus, when a piece of copper is put into a solution of nitrate of silver the copper dissolves, and crystals of silver are produced. He then stated that his assistant, Mr. Tribe, and himself had been lately closely examining these reactions, and he exhibited drawings of the various forms evolved. Weak solutions of silver gave first a black bush, and afterwards white crystals with a sharp thorny appearance; while strong solutions produced first a white moss, and then a rounded branched structure. He also exhibited the process of crystallisation magnified and projected on a screen. When silver was shown growing, the crystals shot out from the copper in every direction. Thallium gave the appearance of a thorny forest; and from tin beautiful crystals formed rapidly at right angles to each other; gold gave black, lilac, and yellow crystals, generally as fringes. Dr. Gladstone stated that the mineralogical forms of these crystals generally resemble those formed by chemical substitution, and he referred to specimens of native gold, silver, copper, and other metals on the table before him. He also exhibited a crystallised silver fibula, found in a tomb in Cyprus, probably about 1500 years old; and, as the silver was enlarged in size by assuming a crystalline structure, he alluded to the importance of selecting for our standards a metal that does not change in bulk. After saying that these crystals are built up in the simplest manner, and that for every atom of one metal deposited an atom of the other is dissolved, he proceeded to consider the manner in which the process takes place. The polarisation theory, he said, necessitates that there should be a weakening of the solution at the end where the metal is deposited, and a concentration of the solution at the end where the metal is dissolved. This was shown to be the case by the currents produced; but, besides this, there is a greater passage of the salt towards the copper plate than the polarisation theory will account for. This was proved by experiments with a divided cell; and that the solution is put into a peculiar condition by the contact of dissimilar metals was shown by water being decomposed by zinc in contact with spongy copper. This entirely new mode of decomposing water was discovered by Dr. Gladstone and Mr. Tribe, and was exhibited for the first time. Dr. Gladstone said that the resistance of the liquid is also an important element. The addition of more salt reduces this resistance; thus twice the strength of the solution gives more than twice the chemical action in the same time, and in many cases it is just three times. In conclusion, he stated that the power thus produced may be carried to a distance, and will then cause the decomposition; and he referred to the electrolytic experiments of Mr. P. Braham, who, by means of a variable battery, had produced crystals of gold, platinum, silver, copper, and other metals, in the same forms as those evolved by chemical substitution.

FOREIGN MINING AND METALLURGY.

The greatest activity prevails at present in the various coal mining centres of France. Everywhere—in the Loire, the Centre, the South, the Nord, and the Pas-de-Calais—a very considerable extraction is going on, and working operations have been accelerated in consequence of the orders which are succeeding each other rapidly, and which lead to anticipations of a brilliant season, unless a new transport crisis should check the progress of the trade. For the present deliveries both by water and railway to Paris are being made in a much more satisfactory manner than hitherto. Prices remain firm, and without variation. The Ahun Collieries Company will pay, on July 15, an interim dividend for 1872 at the rate of 12s. per share.

The condition of the Belgian iron trade continues favourable, prices still displaying an upward tendency. Pig for refining is dealt in at 4l. per ton; casting-pig is still advancing with rapidity; merchants' iron, No. 1, brings 8l. per ton; and sheets are dealt in at 10l. 16s. per ton. The demand for rails is more and more active, and prices, without quite attaining the English level, have continued to advance. A rather important contract is stated to have been concluded at Antwerp at 8l. 12s. per ton, without guarantees. At Charleroi pig appears to be higher than in England, and at Paris French pig seems to be still higher. On the other hand, merchants' iron seems to be lower in Belgium and France than in England. The same may be said of rails. In Germany contracts for rails have been recently let at as high a price as 11l. 12s. per ton; and notwithstanding Customs' duties and heavy transport expenses, Belgian rails seem likely to find important outlets in Germany. For the present, however, Belgian ironmasters are overdone with work, orders arriving simultaneously from all sides, and they have not been able to execute within the prescribed periods a large amount of the work undertaken.

Favourable intelligence continues to come to hand from the Charleroi and Mons coal basins. Coal for industrial purposes is in strong demand, and stocks present generally comparatively little importance. The manufacture of coke in Belgium has been carried to the utmost possible extent compatible with the present means of production, and if new coke ovens are not established shortly it is certain that the proprietors of blast-furnaces about to be lighted will find it impossible to lay in supplies. Boats on the navigations have become more abundant, so that, notwithstanding the scanty supplies of rolling-stock available, coal is got rid of by the Belgian coalowners, although still with a sluggishness which gives rise to considerable dissatisfaction. Coke is quoted at 18s. 4d. to 19s. 2d. per ton. Freights from Charleroi to Paris remain at 8s. per ton. The Couchant du Flénu Colliery Company commenced the payment, yesterday, of a dividend of 4s. per share. The Crachet and Picquery Collieries Company also commenced the payment, yesterday, of a dividend of 10s. per share.

The Prag-Bubnaer Railway Plant Company is so overdone with orders that the directors are on the point of making an extension of the works, and of calling up additional capital with that object. The company expects to supply all the plant required for two new railways in course of construction. It is reported that the great Krupp works, at Essen, are being supplied with tools which will enable them to apply themselves to the construction of railway plant. A contract for 16,500 fish-plates has been let at Wiesbaden at the high rate of 84 thalers per ton. Another contract for 9500 iron girders was let at 72⅓ thalers per ton. Messrs. Henschel and Co., of Cassel, have obtained a contract for four goods engines for the Right Bank of the Oder Railway, at 19,500 thalers per engine. Mr. Woehlert, of Berlin, will supply the reserve pieces of these engines at 5350 thalers per engine. Messrs. Henschel will also supply the same company with two tank-engines, the Hanoverian Engine Building Company supplying the reserve pieces.

The French iron trade continues animated, pig especially being in demand at very good prices, and in considerable quantities; no check to the production is apprehended for some time. Machine iron, iron wire, &c., participate in the general activity, and prices are maintained with the greatest firmness. It is remarked that the connection of the Haute-Marne works is steadily extending both the South and the Ardennes have been increasing their orders of late, and an easy and abundant sale for Haute-Marne products is experienced on the Channel and Atlantic coasts. In the Franche-Comté district charcoal-made pig remains in disfavour; it sells at 6l. 12s. to 6l. 16s. per ton, but this price is not very remunerative; upon the whole, Franche-Comté metallurgy appears to be losing ground every day. In the Meurthe and the Moselle coal has been a good deal wanted, and it is stated that efforts have been made by the industrials of that district to obtain coke from the Ruhr basin. At Paris, notwithstanding the increasing activity of the iron trade, prices are not so high as might have been expected, having regard to the persistent advance in quotations in England, Belgium, and Germany. First-class merchants' iron has been dealt in at Paris at 8l. 12s. per ton, and plates have brought 11l. 12s. to 11l. 16s. per ton. French casting pig is quoted at 5l. 4s. to 5l. 8s. per ton. The French construction workshops are more and more overdone with orders as well on French as on foreign account. It is stated that the Creusot works have engaged to supply the iron required for a great bridge at Pesth, for which MM. Gouin have contracted.

The French copper markets, after having been rather animated, have again given way, in consequence of less favourable advices received from England. At Paris, Chilian in bars, delivered at Havre, has brought 88l. per ton; ditto English, 93l.; tough English, 93l.; and Corocoro minerals, pure standard, 90l. per ton. At Marseilles, Spanish copper has realised 86l. per ton. Upon the German copper markets transactions have been less animated than formerly, and prices have displayed rather a downward tendency; at the same time, the variations which have taken place are scarcely worth noting. The French tin markets have not displayed favourable tendencies. Banca delivered at Havre or Paris has brought 153l. per ton; Straits, 149l. per ton; and English, delivered at Havre or Rouen, 149l. per ton. In Germany, also, the price of tin has given way a little. At Rotterdam tin has been rather more animated; disposeable Banca has changed hands at 85 fls., and some transactions have taken place at the same rates for deliveries to be made in April and May. Disposeable Billiton has brought 84 fls. Lead has maintained its price pretty well upon the French markets. At Havre, French delivered at Paris has brought 19l. 6s.; Spanish, delivered at Havre, 19l. 4s.; and English, delivered at Havre, 19l. 4s. per ton. The Dutch lead maskets have presented no variation. There has been scarcely any change in zinc upon the French and German markets.

FOREIGN MINES.

UNITED MEXICAN.—Extract of despatch from Mr. Edward Hay, dated Guanaxuato, Jan. 24:—In the mines of Jesus Maria and Remedias the usual fluctuations have been observed, but, on the whole, appearances are less favourable than at the date of the last report. In the mine of Encinillas a little good ore has been discovered in a new place, and Mr. Hay has resolved upon continuing work there, partly with a hope of making further discoveries, and partly for the sake of increasing the extraction of ore for the amalgamation works.—New Concern—Adit of San Cayetano: The end of the adit is again covered with espejuelo (sliming quartz), and from time to time thin strips of quartz make their appearance. A little water has begun dripping from the upper part of the excavation, but otherwise the look of the end is the same as before reported. In the cross-cut south we are still driving through veinstuff. We are now 10 varas in the lode, measured from the first reliz (wall of the lode) we cut. The water came out abundantly for the first 4 varas; then we drove through about 5 varas of dry veinstuff, and yesterday morning the water made its appearance again, moderately in the end, which makes me believe that we are getting near to the upper wall of this vein. The pintas (appearances) continue the same as those we have hitherto observed since we cut the lode; but unfortunately there is no sign of silver. During the month of December we drove only 1⅜ vara, but in the three weeks of the present month of January the advance has been 3¼ varas. The total distance driven in the adit in the Buenos Ayres ground is 126 varas.—Mine of San Antonio de la Ovejera: Since the narrow strip of quartz cut three weeks ago in the frente of Santa Elodia the work has continued in the same class rock met with on opening this new end. Total distance driven, 23 metres.

MALPASO (Gold).—The general agent (Jan 18.) writes:—The watercourse, with the exception of the launders required in several places, is now almost finished. I have 3000 ft. of plank cut, and three saws constantly at work cutting more; and during this week we shall send two or three native carpenters, under the direction of Mr. W. Adams, a mechanic of long experience in this country, to make launders and the plume for receiving the gravel. The board may rely upon the water being placed on the top of the gravel deposit before next mail leaves. I have engaged a smith to put the hydraulic machinery together, so as to prevent any delay in the operations.

ANGLO-ARGENTINE.—Capt. Joseph Vivian's report for December, states—On Dec. 30 the first 12 heads of Haymen's stamping-mill were started, which worked remarkably well. Permanent stamping will probably commence in the early part of ensuing month, if other works in connection are sufficiently advanced. Shafting of arrastres for amalgamating not yet arrived, but if the troop is not in with same on or about the time stipulated temporary shafting will be made here. He hoped they would not be compelled to do this, as all their force of mechanics are busily engaged on other important work, which would have to go under suspension. Buildings for reduction works are progressing apace. In the mine department operations are progressing satisfactorily at all points. The old workings have been cleared of debris. He had thereby been enabled to examine the lode thoroughly, and he is very much pleased with it, it is large and presents a fine appearance. The reports given from time to time by natives relative to the size of this lode and quantity of ore available he could now corroborate. Their statements as to its value may be equally correct. He had seen several samples washed, and they all show gold—some more than others, but this he did not consider a reliable test, as the gold is not equally disseminated through the lode. The only correct method of ascertaining the true value of a lode is to pass a large body of it through the stamps, and this they would soon be in a position to do. At section Manager and at North Mine operations have been pushed on with the usual results, fair amount of work accomplished and a large quantity of ore obtained. The force is sufficient for present requirements. The general health continues favourable.

CAPE (Copper).—The returns for the month—yield from Ookiep 575 tons, from Spectakel 114 tons of ore. Transport—From Ookiep 535 tons of ore and 50 tons of regulus, from Spectakel 23 tons of ore. The Martha Stevens, with 326 tons of ore, sailed from Hondeklip for Swansea on January 12. The America and William Graham were expected to sail about Jan. 20 with 800 tons (together). The Juliet Daniel arrived out on Jan. 7 to load about 450 tons. The G. I. Jones with 537 tons of ore has arrived at Swansea.

WEST CANADA.—Jan. 25: Wellington: The new stope east of Rowe's shaft continues to yield 2½ tons of ore per fathom. The other stope east of this shaft has improved, and now yields 3 tons per fathom.—Huron Copper Bay: The lode in the present end of the 60, east of Bray's shaft, is not quite so productive, but yields 1 ton per fathom. The cross-cut north at the 50, west of Palmer's shaft, is without alteration. We have commenced a new stope in back of the 60, east of Bray's shaft, and it is yielding 2½ tons per fathom. The stope in the bottom of the 50, west of Palmer's shaft, yields 2½ tons per fathom; and the stope under the 35, 3 tons per fathom. We have two stopes in the bottom of the 35, east of Bray's shaft, yielding 2½ tons of ore per fathom each; and one under the same level west, on the Fire lode, also producing 2½ tons. In the bottom of the 20, east of new engine-shaft, the stope yields 2 tons per fathom. At Bray's shaft the men are engaged in cutting ground and putting in pent-house at the 60 fm. level.

[For remainder of Foreign Mines see to-day's Journal.]

GOLD DIGGINGS OF VICTORIA.—Last month's Australian mail brought a statement that the largest cake of gold ever seen, was exhibited in Sandhurst and Melbourne, the weight of which was 2564 ozs., with a value of over 10,000l. That cake was the result of a fortnight's work of the Great Extended Hustler's Quartz Mining Company, Sandhurst. But the same company, in their next fortnight's work, altogether surpassed their previous success, and turned out a cake weighing no less than 3764 ozs., and worth more than 15,000l. The yield from quartz mines now exceeds that from alluvial mines. It is stated that the Stockyard Creek diggings, situated near Port Albert, and close to the most southern point of the Australian continent, may be now classed among the permanent gold fields of the colony. These diggings, which were only discovered some few months ago, are situated in a part of the colony not previously found to be payable as a gold field, and it is thought that very shortly the country between them and the next diggings, some 40 or 50 miles inland, will be all found to be of more or less gold-bearing character. At present the country referred to is an almost impenetrable scrub, in which it is next to impossible for travellers to penetrate; but it is expected that tracks will soon be cut through it, after which prospecting in it will no doubt be energetically carried on. In December two nuggets, weighing respectively 21 ozs. and 32 ozs., were obtained in one claim at Stockyard Creek.

SATURN SMELTING WORKS.—A correspondent furnishes us the following particulars concerning these works, situated about a quarter of a mile south of Sandy station, on the U. S. Railroad. The smelting-house is 72 by 35 feet, and 20 feet high, having three furnaces, built of Utah firestone and brick, 8 feet square at the base and rising to a height of 30 feet, with self-acting syphons, and pillars of cut sandstone, well bound by 46 iron rods and 80 angle-plates on each furnace. The engine-house attached is 35 by 20 feet, 12 feet high, with 25-horse power engine and boiler, having a well for its water supply 120 ft. deep, 4 ft. in the clear, and a water privilege from Cottonwood, to supply tuyeres, &c. The building is entirely enclosed with boarding and battening, with folding door. Some 60 feet north stands the company's boarding-house, a two-story building 40 by 20 feet, containing kitchen, dining room, sitting room, and three bed-rooms. The works were completed in eight weeks from the removal of the first sod by Mr. Raymond, resident engineer, to the entire satisfaction of Mr. Wessell, who had the personal inspection of the works. Morris and Evans, builders of this city, were the contractors.—*Salt Lake City Herald.*

DEPOSITING NICKEL ON METALS.—The improved method invented by Mr. JOHN UNWIN, of Sheffield, consists in depositing the nickel on or coating all kinds of metal with nickel by means of an electro-magnetic machine, instead of by a galvanic battery as hitherto used for that purpose. The deposit will be made from a solution of nickel composed of (say) about two parts oxalate of potash and about three parts of sulphate of potash dissolved in about 12 gallons of water, with about 1 lb. of nickel metal dissolved, with nitric acid added to the whole.

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